TERABEAM™ WIRELESS

BRiB-II™
User Guide

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MNL-500252-001
Version 1.0
March 2005

LIMITED WARRANTY

Terabeam Wireless (Terabeam) warrants that your device is free of defects in material and workmanship for a period of one year after initial purchase. Terabeam will, in this period of time, repair or replace, any Terabeam product returned to the factory, freight prepaid.

The Terabeam warranty covers repairs or replacement (at Terabeam's option) of the product only. Terabeam is not responsible for the cost of removal, reinstallation, or shipping to the place of repair. Terabeam does not extend or modify its warranty period as a result of repair or replacement.

Terabeam reserves the right to void a warranty and/or make reasonable charges for repair of a unit if the warranty seal is broken or the unit displays evidence of misuse, abuse, or tampering.

Terabeam is not responsible for damage to any other equipment or property, or any other consequential or incidental damages of any kind, whether based on contract, negligence, or strict liability. Maximum liability shall not in any case exceed the purchase price of the unit.

Warranties give you (the buyer) specific legal rights. You may also have other rights that vary from state to state. This warranty is only extended to purchases made in the United States of America or its possessions.

SPECIAL WARRANTY NOTICE

The warranty is null and void if any of the following occurs:

1. The product enclosure is opened.
2. The connections are not properly waterproofed.
3. The device is installed improperly or with incorrect connectors.
4. The round connector of the outdoor Ethernet cable (if provided) is improperly plugged into the rear jack of the enclosure.
5. The device or DC Power Injector (if provided) are physically damaged.
6. The device is operated outside the recommended DC power specifications.
7. The device is damaged by extreme forces of nature, lightning, or 'Acts of God.'

FCC NOTICE

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. *This device may not cause harmful interference, and*
2. *This device must accept any interference received, including interference that may cause undesired operation.*

** Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.*

These products are labeled with one of the following FCC ID numbers:

FCC ID: NM5-ETH-ANT
NM5-ETH-ANT-LR

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Section 1
Overview

1.1 Description

Terabeam's second generation of BRidge-In-a-Box (BRiB-II™) is a complete wireless point-to-point (P-P) solution that bridges two LANs together using the license-free 2.4 GHz band. It consists of two 18 dBi gain flat panel directional antennas with built-in 802.11b wireless LAN devices, and features the award-winning industry standard TurboCell® software, a protocol which significantly enhances the performance of outdoor 802.11b systems through the use of adaptive dynamic polling, bandwidth allocation at the client, and packet aggregation.. The two antennas connect to the LAN's Ethernet switches on each end with an outdoor-rated Ethernet cable (ordered separately). The BRiB-II is ideal for connecting two office LANs together, or for linking a WIPOP site to an Internet backbone.

The two antennas operate at 11 Mbps over-the-air, and feature the highly secure 128-bit WEP-Plus (Wired Equivalent Privacy) encryption which, if enabled, provides extra security above standard 802.11b WEP. The link is also transparent to VLAN tags for the most secure link. The BRiB -II will accommodate virtually an unlimited number of client MAC addresses on each side of the link. The MAC addresses of the LAN clients on one side appear on the other side of the link wirelessly. It is remotely configured and managed with the Windows-based Terabeam Configurator software.

With the wireless client adapters built right into the antennas, professional antenna installation is not required. All that is needed is to ensure that the antennas are optimally aimed and have clear line of sight (LOS) to each other. The antennas can be mounted either vertically or horizontally polarized. Selecting the appropriate polarization for your area will minimize or even completely eliminate interference from other outdoor installations in the 2.4 GHz band.

Two versions of the BRiB-II are available: the standard series BRiB-II with an integral 18 dBi gain flat panel antenna, and the BRiB-II–LR with the addition of an integrated bi-directional fixed amplifier to boost range and improve reception. The WLAN device located in the antenna gets its power from the DC Power Injector which puts DC power onto the Ethernet cable. Up to 300 feet of Ethernet cable (ordered separately) between the DC injector and the antenna can be used with no signal loss.

Both the BRiB-II and the BRiB-II–LR version use a 110/220 VAC to 48 VDC power supply.

1.2 Bridge-in-a-Box-II Features

Key Features

- Complete 2.4 GHz wireless bridging system
- Easy to install and configure
- Bridges two LANs together transparently
- Supports VLAN bridging (802.1q protocol)
- Plugs directly into an Ethernet Switch or Router on each side of the link
- 802.11b radio built right into the 18 dBi gain panel antenna
- -LR models feature a built-in amplifier and provide the maximum range possible
- Weatherproof: designed and rated for outdoor use
- Provides extended range coverage by focusing the radio signal
- Antenna and Ethernet cable are designed for outdoor use
- Antenna is lightweight and thin, just 1.25 inch thick and 15.5 inches square
- Can be mounted in either vertical or horizontal polarization
- Mounts either to a wall or antenna mast of up to 1 3/4 inches in diameter
- Flat panel antenna offers 18 dBi gain and 18^{o} beamwidth
- Transmit power of 2 Watts EIRP and 16 Watts EIRP on –LR model
- Line of sight range up to 3 miles or more possible (10 miles or more with the –LR version)
- Up to 4.5 mbps actual throughput
- FCC Part 15 Certified for license-free operation (11 channels USA)
- Professional installation is not required by FCC Part 15 rules
- No need for bulky RF cables or for fragile RF adapter cables
- System is optimized to provide for the maximum possible range without having to worry about coax cable loss
- DC power for electronics in the antenna are carried up the Ethernet cable (Power Over Ethernet, POE)
- Windows-based Configuration Software
- Can be configured and monitored remotely from anywhere in the network
- Operating temperature range: -20°C to +50°C

1.3 Bridge-in-a-Box-II Kit

Each BRiB-II kit includes the following (refer to Figure 1.1a):

- Two 18 dBi gain flat panel antennas with built-in radios (-LR models feature an integrated bi-directional amplifier for increased transmit power and receive signal sensitivity for longer range)
- Sturdy steel wall/mast tilt-bracket mounts
- Two Cat 5 DC Power Injectors
- Two 110/220 VAC to 48 VDC wall adapters
- CD-ROM with Windows-based software and documentation

A Terabeam outdoor Ethernet cable must be ordered separately. Available lengths are 50, 100, 200, or 300 feet (maximum length).

The latest software and User's Manuals can also be found at:

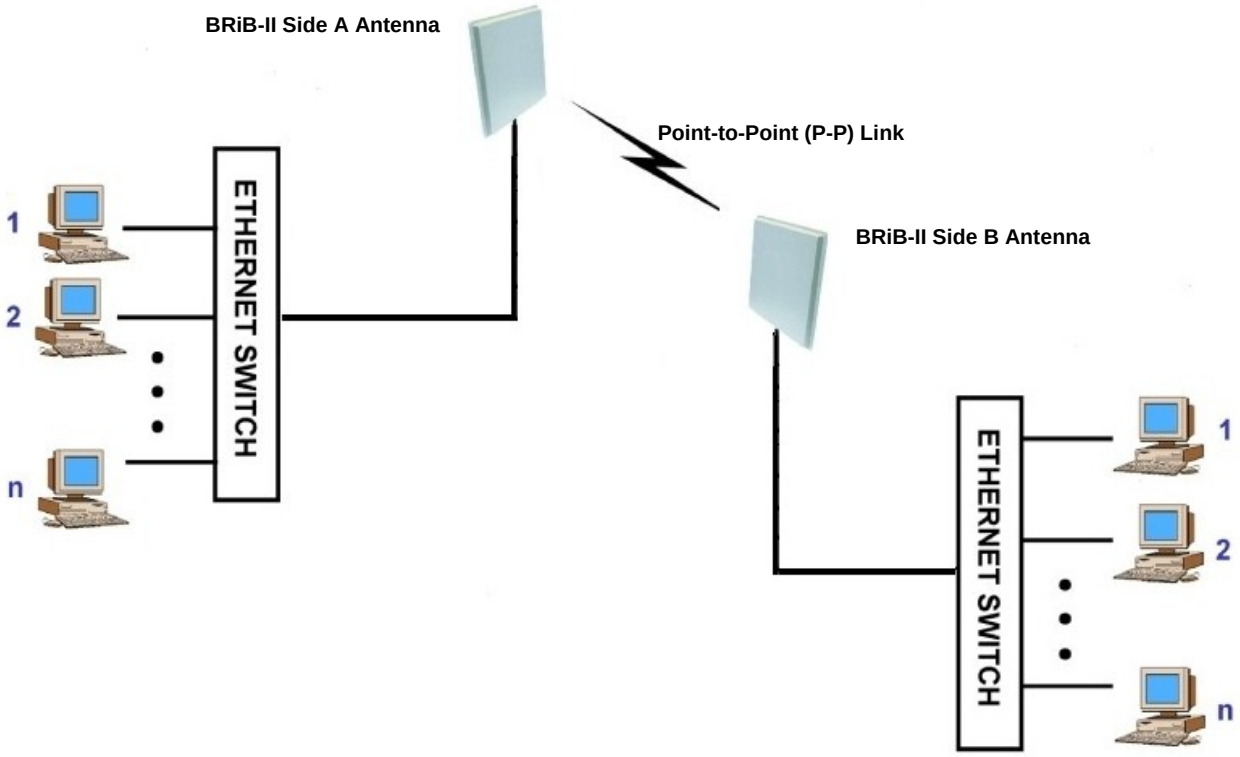
http://www.ydi.com/support/downloads.php, and

http://www.ydi.com/support/documents.php.

Figure 1.1b shows a typical application of the BRiB-II.

Figure 1.1a – BRiB-II, 110/220 VAC Power Supply, Mounting Brackets, and DC Power Injectors

Figure 1.1b – Typical Application



Section 2
Installation

Safety Warning

CAUTION!

This antenna/transmitter device must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meters (6.56 feet) from all persons. Users and installers must adhere to the antenna installation instructions and transmitter operating conditions in order to comply with the FCC's RF exposure requirements.

2.1 Locating the BRiB-II Antennas

The most important aspect of setting up the BRiB-II antennas is their location and aiming. For maximum range (up to several miles), it must have clear, unobstructed line of site (LOS) and Fresnel Zone between them. The BRiB-II antennas are designed to be installed outdoors. For maximum range and the strongest signal, the two BRiB-II antennas must literally "see" each other in order to be connected. If they do not have this clear "line of site" (LOS), you will likely not get a reliable, long-range wireless connection. The only way to accurately determine your coverage area is to put up the BRiB-II antennas in the best locations available and run some tests.

NOTE: It is strongly recommended that you configure and test the units prior to deploying them in the field. Set up a "mini-network" that resembles your actual configuration as close as possible. By using such a mock-up, troubleshooting potential problems will be much easier than if you already installed the equipment in the field. Read through this entire Section 2 to understand how to install the hardware.

2.2 Mounting the BRiB-II Antennas

The BRiB-II antennas can be mounted either vertically or horizontally polarized using the hardware included with the unit. The label located on the back of the antenna contains an arrow indicating the antenna's polarization. Please note that both ends of the link must use the same polarization. They can be mounted to a mast or pipe as shown in Figure 2.1.

It is very important that the Ethernet connector on the antennas be properly waterproofed. Ensure that a high quality all-weather resistant electrical tape and/or other water sealant method, such as Permagum or equivalent, is utilized. **Silicon sealants are not recommended** since they are hard to work with, do not ensure a 100% waterproofing of the connectors and are difficult to remove, if ever necessary.

The antenna itself or the mast where it is bolted to should be connected to an Earth ground. Fig. 2.1 shows the possible grounding points that you can use.

Important: Please notice that the two units are clearly identified as side A and side B of the P-P link (see Fig. 2.2). The two units are **not** interchangeable.

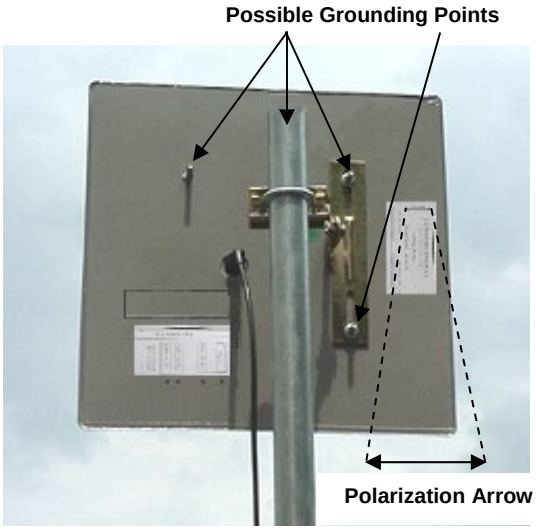
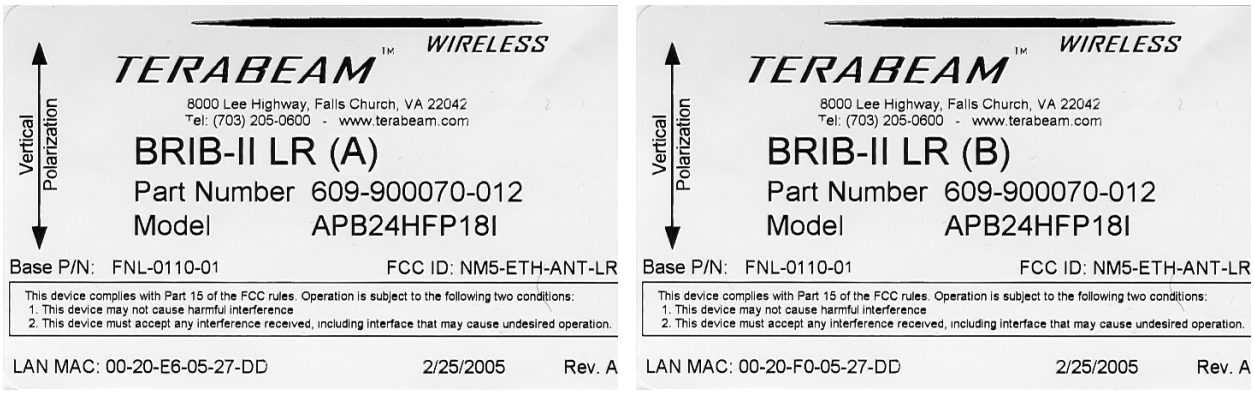


Figure 2.1 shows the antenna in a horizontally polarized installation. It must be carefully aimed at the other antenna and be mounted with the same polarization. The housing is sealed to prevent water build-up in the antenna. The round connector must also be sealed after it is plugged into the antenna. Be sure to provide strain relief for the Ethernet cable as well.

Horizontal polarization is generally better since most other outdoor systems use vertical polarization. By mounting the BRiB-II antennas horizontally polarized, you will minimize interference from these systems.

Figure 2.1 – Outdoor Pole Mount Installation

Figure 2.2 – BRiB-II Labels Identifying Side A and Side B of the P-P Link
(Note: the two units are <u>not</u> interchangeable)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Vertical Polarization
BRIB-II LR (A)
Part Number 609-900070-012
Model APB24HFP18I
Base P/N: FNL-0110-01
FCC ID: NM5-ETH-ANT-LR
This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference
2. This device must accept any interference received, including interface that may cause undesired operation.
LAN MAC: 00-20-E6-05-27-DD
2/25/2005
Rev. A
TERABEAM
WIRELESS
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Vertical Polarization
BRIB-II LR (B)
Part Number 609-900070-012
Model APB24HFP18I
Base P/N: FNL-0110-01
FCC ID: NM5-ETH-ANT-LR
This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference
2. This device must accept any interference received, including interface that may cause undesired operation.
LAN MAC: 00-20-F0-05-27-DD
2/25/2005
Rev. A

2.3 DC Power Injector

The Cat 5 DC Power Injector is not in a waterproof enclosure and must be protected from the weather. It can be permanently mounted to a surface using the double stick tape found on the back of it.

2.4 Power Supply

The BRiB-II antennas come with a 110/220 VAC to 48 VDC power supply that has a standard barrel plug [center pin positive (+) tip and outer ring negative (-)].

CAUTION!

*Former BRiB-II units used a 15 VDC Power Supply. Care must be followed not to confuse the current with the former units since this may damage a former 15 VDC unit if a 48 VDC Power Supply is used with it. Likewise, operating a current BRiB-II version with less than 48 VDC will cause improper operation. Any damage caused by these actions will **not** be covered by the factory warranty and will be a billable repair.*

The current units have an LED label which clearly identifies them as 48 VDC units. Please see Figure 2.5 for the location of the label and description of LEDs.

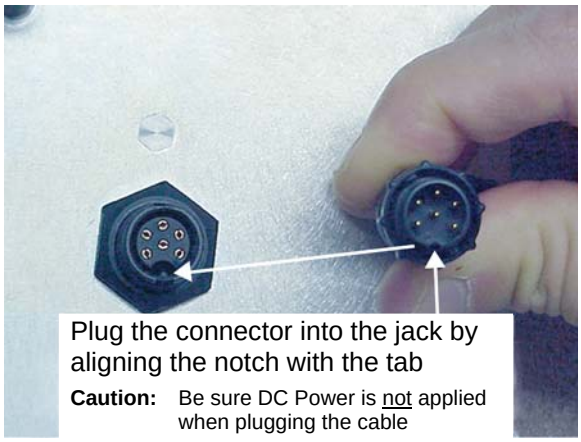
2.5 Hardware Installation

Perform the following procedures for both antennas once you have determined their optimal location:

1. Use the brackets and screws to mount the flat panel antenna to a pole with a maximum diameter of up to 1 3/4 inches.

2. Ensuring that there is no DC power applied to the cable, plug the 6-pin N-male round connector of the outdoor Ethernet cable into the rear jack of the flat panel antenna, making sure the notch on the connector is correctly aligned with the tab on the jack as shown on Figure 2.3. Turn the round locking nut clockwise as you push in until it securely fastens onto the jack. **Please verify that the round connector is properly plugged into the rear jack of the antenna prior to connecting DC power** because it is possible to push it in the wrong way if enough force is used. If DC power is applied and the connector is not properly plugged, damage to the electronics of the unit or the connector itself may occur which will **not** be covered by the factory warranty.

Figure 2.3 – Plugging the Outdoor Ethernet Cable


Plug the connector into the jack by aligning the notch with the tab
Caution: Be sure DC Power is not applied when plugging the cable

CAUTION!

*If DC Power is applied while you are attempting to insert the round connector into the jack, it is possible that, as you rotate the plug in an effort to find the key, DC power pins will momentarily touch the Ethernet pins. **If this happens the Ethernet circuitry on the board will be damaged**. Also, do not apply excessive pressure when you insert the round connector or the pins will pop out. Any damage caused by this action will not be covered by the factory warranty and will be a billable repair.*

3. Attach the other end of the outdoor Ethernet cable to the Cat 5 DC Power Injector at port RJ-45 labeled "To Antenna."

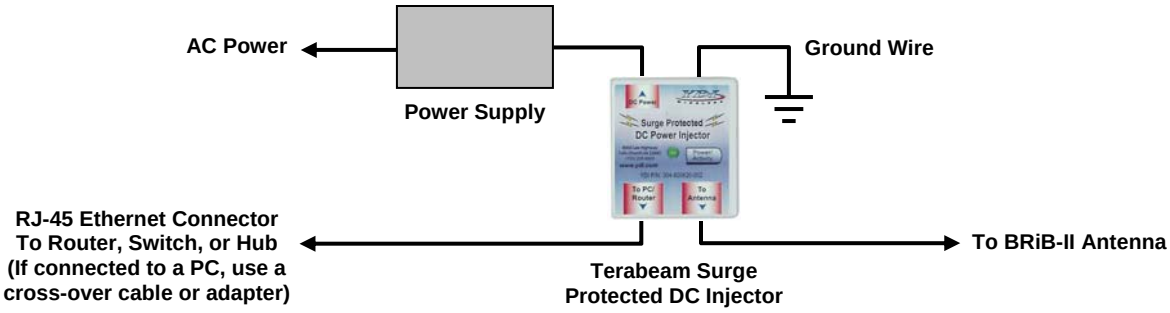
4. Connect the Ethernet cable labeled "To PC/Router" from the Cat 5 DC Power Injector into a regular port on your router, switch or hub. If you connect to a laptop or PC, use a cross-over cable or adapter.

5. Perform an Earth ground connection to any of the rear bolts of the unit, the mounting brackets, or the mast (if metallic) (refer to Fig. 2.1). For maximum protection, also connect the metal wire of the surge protected DC Injector to ground as shown on Figure 2.4.

6. Connect the barrel plug of the power supply to the "DC Power" jack on the Cat 5 DC Power Injector, then plug the Power Supply into an AC outlet. Check that the Power LED turns on. If there is traffic over the wireless medium the Wireless Link LED should be flashing. If the Ethernet port is active the Ethernet Link LED should be flashing. Radio Status should be off, it turns on only when there is a malfunction of the internal card (refer to Fig. 2.5). Also, a water-proof plug is located next to the LED label. You may remove this plug to gain acces to a reset push button inside the BRiB-II for disaster recovery, or if so instructed by your Terabeam support representative during troubleshooting or technical assistance.

7. Configure the BRiB-II using the Configurator software. Please refer to the **Marquee Series Configuration Guide**, available as a pdf file on your CD ROM. Also, an online help is available by pressing **F1** or clicking **Help-> Index** from the main screen.

Figure 2.4 – Installation of the Terabeam Surge Protected DC Injector for Maximum Grounding Protection



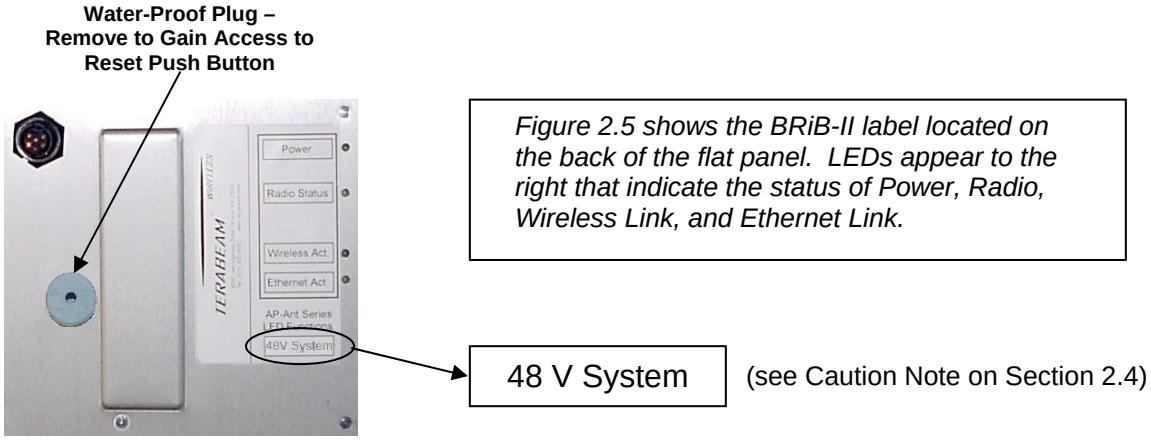

Water-Proof Plug –
Remove to Gain Access to
Reset Push Button
Power
Radio Status
Wireless Act
Ethernet Act
48V System
Figure 2.5 shows the BRiB-II label located on the back of the flat panel. LEDs appear to the right that indicate the status of Power, Radio, Wireless Link, and Ethernet Link.
48 V System
(see Caution Note on Section 2.4)

Figure 2.5 – BRiB-II Label and LEDs